

WHAT IS CLAIMED IS:

- 1 1. A variable voltage protection device comprising:
 - 2 a ground plane;
 - 3 a layer of neat dielectric polymer or glass in contact with one
 - 4 surface of the ground plane; and
 - 5 at least one electrical conductor of an electronic device in
 - 6 contact with said neat dielectric polymer or glass layer;
 - 7 wherein the neat dielectric polymer or glass layer positioned between
 - 8 and in contact with the ground plane and said electrical conductor
 - 9 consists essentially of a layer of neat dielectric polymer or glass having
 - 10 a thickness of less than about 1.6 mils.
- 1 2. A device according to Claim 1 wherein the polymer layer is less
- 2 than about 0.8 mil.
- 1 3. A device according to Claim 1 wherein the polymer layer is less
- 2 than about 0.5 mil.
- 1 4. A device according to Claim 1 wherein the polymer layer is less
- 2 than about 0.2 mil.
- 1 5. A variable voltage protection component for placement between
- 2 a ground plane and an electronic circuit comprising:
 - 3 a layer of variable voltage material comprising a binder
 - 4 containing conductive particles or semiconductive particles; and
 - 5 a layer of neat dielectric polymer or glass in contact with one
 - 6 surface of said layer of variable voltage material;

7 wherein the neat dielectric polymer or glass layer is present in a
8 thickness of less than about 1.6 mils.

1 6. A component according to Claim 5 wherein the neat dielectric
2 polymer or glass layer is less than about 0.8 mil.

1 7. A component according to Claim 5 wherein the neat dielectric
2 polymer or glass layer is less than about 0.5 mil.

1 8. A component according to Claim 5 wherein the neat dielectric
2 polymer or glass layer is less than about 0.2 mil.

1 9. A component according to Claim 5 comprising a layer of neat
2 dielectric polymer or glass in contact with the second surface of the
3 layer of variable voltage material.

1 10. A component according to Claim 6 comprising a layer of neat
2 dielectric polymer or glass in contact with the second surface of the
3 layer of variable voltage material.

1 11. A variable voltage protection component for placement between
2 a ground plane and an electronic circuit comprising:
3 a first layer of variable voltage protection material comprising a
4 binder having dispersed therein at least about 20% by volume of
5 conductive or semiconductive particles;
6 a second layer of variable voltage protection material in contact
7 with the first layer comprising a binder having dispersed therein at least
8 40% by volume of conductive or semiconductive particles; and

9 a third layer of variable voltage protection material in contact
10 with said second layer comprising a binder having dispersed therein at
11 least 20% by volume of conductive or semiconductive particles.

1 12. A component according to Claim 11 wherein at least one of the
2 layers of variable voltage protection material comprises conductive
3 particles and semiconductive particles.

1 13. A component according to Claim 11 wherein the volume percent
2 in the three layers comprise at least about 30%, at least about 40%
3 and at least about 30% respectively.

1 14. A component according to Claim 12 wherein the volume percent
2 in the three layers comprise at least about 30%, at least about 40%
3 and at least about 30%, respectively.

1 15. The component according to Claim 11 wherein the volume
2 percent in the three layers comprise at least about 30%, at least about
3 60% and at least about 30%, respectively.

1 16. A component according to Claim 12 wherein the volume percent
2 in the three layers comprise at least about 30%, at least about 60%
3 and at least about 30%, respectively.

1 17. A component according to Claim 11 comprising a layer of neat
2 dielectric polymer or glass in contact with one surface of said
3 component wherein the neat dielectric polymer or glass layer is present
4 in a thickness of less than about 1.6 mils.

1 18. A component according to Claim 12 comprising a layer of neat
2 dielectric polymer or glass in contact with one surface of said
3 component wherein the neat dielectric polymer or glass layer is present
4 in a thickness of less than about 1.6 mils.

1 19. A component according to Claim 17 comprising a layer of neat
2 dielectric polymer or glass in contact with the second surface of said
3 component.

1 20. A component according to Claim 18 comprising a layer of neat
2 dielectric polymer or glass in contact with the second surface of said
3 component.

1 21. A variable voltage protection component for placement between
2 a ground plane and an electronic circuit comprising:
3 a first layer of variable voltage protection material which is in
4 direct contact with an electrical conductor in said electronic circuit and
5 comprises a binder having dispersed therein at least about 20% by
6 volume of conductive or semiconductive particles; and
7 a second layer of variable voltage protection material in contact
8 with the first layer comprising a binder having dispersed therein at least
9 40% by volume of conductive or semiconductive particles.

1 22. A variable voltage protection component according to Claim 21
2 further comprising a third layer of variable voltage protection material
3 in contact with said second layer comprising a binder having dispersed
4 therein conductive or semiconductive particles at a % by volume which
5 is different than the second layer.

1 23. A variable voltage protection component for placement
2 between a ground plane and an electronic circuit comprising:
3 a layer of neat dielectric polymer or glass which is in direct
4 contact with an electrical conductor in said electronic circuit;
5 a first layer of variable voltage protection material in contact
6 with said layer of neat dielectric polymer or glass and comprises a
7 binder having dispersed therein at least about 20% by volume of
8 conductive or semiconductive particles; and
9 a second layer of variable voltage protection material in contact
10 with the first layer of variable voltage protection material comprising a
11 binder having dispersed therein conductive or semiconductive particles
12 at a⁴⁰% by volume which is different than in said first layer.

1 24. A variable voltage protection component according to Claim 23
2 further comprising a third layer of variable voltage protection material
3 in contact with said second layer comprising a binder having dispersed
4 therein conductive or semiconductive particles at a²⁰% by volume which
5 is different than the second layer.

1 25. A method of making a variable voltage protection material
2 comprising:
3 forming a mixture comprising conductive particles and insulating
4 particles in a light organic solvent;
5 mixing said mixture to disperse the insulating particles in the
6 conductive particles;
7 evaporating at least a portion of the solvent; and
8 mixing the resultant mixture of conductive particles and
9 insulating particles with a binder to form a variable voltage protection
10 material.

- 1 26. A method according to Claim 25 comprising:
 - 2 sieving the mixture of particles and solvent before evaporating
 - 3 the solvent.
- 1 27. A method according to Claim 25 comprising:
 - 2 adding semiconductive particles to form a mixture comprising
 - 3 conductive particles, semiconductive particles and light organic
 - 4 solvent.
- 1 28. A method according to Claim 25 comprising:
 - 2 forming a separate mixture comprising semiconductive particles
 - 3 and insulative particles in a light organic solvent;
 - 4 mixing said mixture to disperse the insulating particles in the
 - 5 semiconductive particles;
 - 6 evaporating at least a portion of the solvent; and
 - 7 mixing the resultant mixture of conductive particles and
 - 8 insulating particles and the resultant mixture of semiconductive
 - 9 particles with a binder to form a variable voltage protection material.